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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/689,632
Filing Date: October 13, 2000
Appellant(s): TAHON ET AL.

Mary J. Breiner
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed April 4, 2005.

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(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is incorrect. The response after final, dated November 2^{nd}, 2004, was a request for reconsideration. No amendment after the final dated July 2^{nd}, 2004, has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection is substantially correct. The changes are as follows: Claims 4-5, 8-10 and 14 are rejected under 35 U.S.C. 103(a) as a group and claims 7, 11-12 are rejected under 35 U.S.C. 103(a) as a group.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

US 5,118,538	Escher	06-1992
US 5,286,414	Kämpf	02-1994
US 5,465,169	Eguchi	11-1995

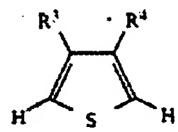
(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

A. <u>Rejection of claims 4-5, 8-10 and 14 under 35 U.S.C. 103(a)</u>

Regarding claims 4, 8, 14, Escher has a liquid crystal display where the alignment layer (orienting) is in direct electrical contact with the associated electrode (electroconductive layer) (column 2, lines 2-12). The electrically conductive polymer, which is part of the alignment layer, is a polythiophene when the X is sulfur in formula (I)

of Escher (column 2, lines 15-30). Escher discloses the thiophene monomer of formula (II) below:

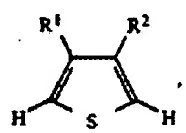


(II)

> where at least one of the two radicals R^3 and R^4 is an alkoxy group and the other is optionally (C_1-C_6)alkyl or hydrogen, have already been described in DE-A 3,717,668, DE-A 3,628,895 and DE-A 3,736,114. The preparation, the stability and electrical conductivity of the various, positively doped polymers were also investigated therein.

wherein R^3 and R^4 are in the same positions of Applicant's claimed –O-R^1 and –O-R^2 on the thiophene ring. The two hydrogens flanking the sulfur atom are replaced when the repeat units are linked at the same positions upon polymerization of the thiophene monomer. Escher discloses that R^3 and R^4 have already been described in DE-A 3,717,668.

US 5,286,414 (Kämpf) is the US equivalent of DE-A 3,717,668. Kämpf teaches the thiophene monomer formula below:



(I)

> in which
> R^1 denotes a C_1-C_{12} alkoxy group or —$O(CH_2CH_2O)_nCH_3$ where n=1 to 4 and
> R^2 denotes a hydrogen atom, a C_1-C_{12} alkyl group, a C_1-C_{12}-alkoxy group, or —$O(CH_2CH_2O)_nCH_3$ where n=1 to 4, or
> R^1 together with R^2 represents —$O(CH_2)_m$—CH_2— or —$O(CH_2)_m$—O—, in which m is 1 to 12.

wherein R^1 and R^2 occupy the same positions of claimed –O-R^1 and –O-R^2 on the thiophene ring. Kämpf teaches that R^1 and R^2 together represent –O-$(CH_2)_m$-O—where

m is 1 to 12 (column 2, lines 30-55), which encompasses the claimed limitation that R^1 and R^2 together represent a C1-C4 alkylene group where m is 1 to 4.

Therefore, because Escher discloses that Kämpf describes alternate electrically conductive polymers which are also investigated, with their disclosure right after the disclosure of the preferred electrically conductive polymer in the liquid crystal orienting layers, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used the analogous thiophene monomer described by Kämpf as an alternate to the thiophene monomer preferred by Escher, in order to obtain an electrically conductive polymer for an alignment layer which provides a liquid crystal display with the desired physical properties.

Escher teaches that the liquid crystal alignment layer is obtained by a method of making a liquid crystal alignment layer comprising the steps of (i) providing the polythiophene (electrically conductive polymer) as a layer on a substrate (coated onto a glass substrate) (column 5, lines 30-35), and (ii) mechanically rendering said layer liquid crystal aligning (gently stroked twice in the same direction with a stroking machine) (column 5, lines 35-40).

Regarding claim 5, Escher teaches that the specific conductance of the electrically conductive polymer should be at least 10^{-5} Siemens (column 3, lines 30-40), which means that the surface resistivity of the electrically conductive polymer is very low. A chemical composition and its properties are inseparable. If the prior art teaches the chemical structure, the properties applicant discloses and/or claims are necessarily present. In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). See

MPEP 2112.01. Therefore the polythiophene alignment layer is expected to have a surface resistivity lower than 10^{-5} Ω/□.

Regarding claim 9, Escher teaches that the substrate consists of glass (column 5, lines 30-35).

Regarding claim 10, Escher teaches that each of the substrates is provided with an electroconductive layer (transparent electrode) (column 5, lines 30-45).

B. Rejection of claims 7, 11-12 under 35 U.S.C. 103(a)

Escher teaches the liquid crystal display with the polythiophene alignment layer, as described above. Escher, however, fails to disclose that the electroconductive layer (electrode) is made out of indium tin oxide, that the liquid crystal alignment layer is a patterned layer including conducting and non-conducting areas, or to teach an adhesion-improving anchor layer, which has barrier properties with regard to compounds which may diffuse from the substrate.

Eguchi teaches a liquid crystal display where the alignment layer is provided with an electroconductivity selectively at parts above the electrode so as to provide an improvement in prevention of crosstalk between pixels (abstract). The substrate is provided with an electroconductive barrier (protective) layer (film), and also an alignment layer (film) comprising an alignment material and a polymeric electroconductive compound. The polymeric electroconductive compound in the alignment layer is disposed selectively on the part having the electrode (column 3, lines 55-65) thus forming a pattern of conducting areas on the parts above the electrode, and

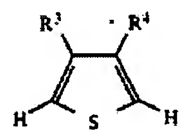
leaving the other areas of the alignment layer non-conducting. The transparent electrodes are of indium tin oxide (column 5, lines 10-15). The polymeric electroconductive compound is polythiophene and derivatives thereof (column 5, lines 55-68).

Eguchi teaches that the barrier layer (protective film 13) is provided between at least one of the substrates 11 and the liquid crystal alignment layer 14 (column 5, lines 10-20). The barrier layer (protective film 13) can be a smooth film of titanium dioxide (column 5, lines 35-45) that has barrier properties with regard to oxygen and/or water vapor, which may diffuse from the substrate. Eguchi teaches that the metal oxide barrier layer (protective film 13) laminates the electrode 12, made of indium tin oxide, to the alignment layer 14 (Fig. 1). Hence the barrier layer 13 also functions as an adhesion-improving anchor layer.

Therefore, because Eguchi discloses electrode materials, alignment layer patterning and barrier layers commonly found in a liquid crystal display, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used indium tin oxide as the transparent electrode of Escher, to have provided a patterned alignment layer including conducting and non-conducting areas, and an adhesion-improving anchor/barrier layer between the alignment layer and the substrate, in order to obtain a liquid crystal display with the desired functionality, as taught by Eguchi.

C. <u>Rejection of claim 17 under 35 U.S.C. 103(a)</u>

Escher has a liquid crystal display where the alignment layer (orienting) is in direct electrical contact with the associated electrode (electroconductive layer) (column 2, lines 2-12). The electrically conductive polymer, which is part of the alignment layer, is a polythiophene when the X is sulfur in formula (I) of Escher (column 2, lines 15-30). Escher discloses the thiophene monomer of formula (II) below:

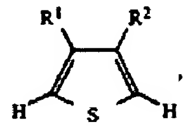


(II)

where at least one of the two radicals R^3 and R^4 is an alkoxy group and the other is optionally $(C_1\text{-}C_6)$alkyl or hydrogen, have already been described in DE-A 3,717,668, DE-A 3,628,895 and DE-A 3,736,114. The preparation, the stability and electrical conductivity of the various, positively doped polymers were also investigated therein.

wherein R^3 and R^4 are in the same positions of claimed $-O-R^1$ and $-O-R^2$ on the thiophene ring. The hydrogens are replaced when the repeat units are linked at the same positions upon polymerization of the thiophene monomer. Escher discloses that R^3 and R^4 have already been described in DE-A 3,717,668.

US 5,286,414 (Kämpf) is the US equivalent of DE-A 3,717,668. Kämpf teaches the thiophene monomer formula on the next page.



(I)

in which

R^1 denotes a C_1–C_{12} alkoxy group or $—O(CH_{n2}C\text{-}H_2O)_nCH_3$ where n=1 to 4 and

R^2 denotes a hydrogen atom, a C_1–C_{12} alkyl group, a C_1–C_{12}-alkoxy group, or $—O(CH_2CH_2O)_nCH_3$ where n=1 to 4, or

R^1 together with R^2 represents $—O(CH_2)_m—CH_2—$ or $—O(CH_2)_m—O—$, in which m is 1 to 12.

wherein R^1 and R^2 occupy the same positions of claimed –O-R^1 and –O-R^2 of Appellant on the thiophene ring. Kämpf teaches that R^1 and R^2 together represent –O-$(CH_2)_m$-O—where m is 1 to 12 (column 2, lines 30-55), which encompasses the claimed limitation that R^1 and R^2 of Appellant together represent a C1-C4 alkylene group where m is 1 to 4.

Therefore, because Escher discloses that Kämpf describes alternate electrically conductive polymers which are also investigated, with their disclosure right after the disclosure of the preferred electrically conductive polymer in the orienting layers, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used the analogous thiophene monomer described by Kämpf as an alternate to the thiophene monomer preferred by Escher, in order to obtain an electrically conductive polymer for an alignment layer which provides a liquid crystal display with the desired properties.

Escher teaches that the liquid crystal alignment layer is obtained by a method of making a liquid crystal alignment layer comprising the steps of (i) providing the polythiophene (electrically conductive polymer) as a layer on a substrate (coated onto a

glass substrate) (column 5, lines 30-35), and (ii) mechanically rendering said layer liquid crystal aligning (gently stroked twice in the same direction with a stroking machine) (column 5, lines 35-40).

(10) Response to Argument

A. Rejection of claims 4-5, 8-10 and 14 under 35 U.S.C. 103(a) over Escher in view of Kämpf

(i) Appellant argues that Escher fails to disclose the polythiophenes according to Appellant's claimed formula (I) in which R^1 and R^2 of Appellant together form an O-[C1-C4 alkylene]-O group or an O-[cycloalkylene]-O group because while Escher claims liquid crystal orienting properties for poly(3,4-dialkoxythiophene), Escher provides no enabling support for the possibility that poly(3,4-dialkoxythiophene)s or poly(3,4-dialkylenethiophene)s exhibit liquid crystal orienting properties, hence not teaching or suggesting that the materials exhibit liquid crystal orienting properties.

Appellant is respectfully apprised that Escher not only teaches that the poly(3,4-dialkoxythiophene) can be used in a liquid crystal orienting layer (column 2, lines 10-25), but also that the layer is mechanically rubbed to form an orienting layer (gently stroked twice in the same direction) (column 5, lines 35-40). Therefore the disclosure of Escher is sufficiently enabling for one of ordinary skill in the art to have made the liquid crystal orienting layer comprising the poly(3,4-dialkoxythiophene).

(ii) Appellant argues that poly(3,4-dioxyalkylene-thiophene)s are not taught by Escher since Escher only discloses that R^3 and R^4 can be alkoxy (-OR), but does not teach R^3 and R^4 as an oxyalkylene, wherein as known in the art, an alkoxy group is an alkyl radical attached to the remainder of the molecule by oxygen.

Appellant is respectfully reminded that Kämpf is the secondary reference which teaches that R^3 and R^4 can together form a dioxyalkylene group.

(iii) Appellant argues that DE-A 3,717,668 is not incorporated by reference into Escher, and [therefore cannot be combined with Escher].

Appellant is respectfully apprised that the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). See MPEP 2145[R-2] III. The disclosure by Escher of prior art electrically conducting polymers of formula (II) right after formula (I), of Escher, is indicative that formula (II) may be used as an alternate in place of preferred formula (I) of Escher, and the incorporation of these prior art references into the summary (not the background) of the invention of Escher is motivation enough for one of ordinary skill in the art to look them up. Escher does not teach against the use of the prior art electrically conducting polymers of formula (II).

(iv) Appellant argues that the options for R^1 and R^2 in formula (II) are within the definition for formula (I) of Escher, and therefore any implication to be drawn by one

skilled in the art from the reference to the prior art DE-A 3,717,668 [by Escher] must be limited to being within the definition for R^1 and R^2 in formula (I) of Escher, which do not include poly(3,4-dioxyalkylene-thiophene)s.

Appellant is respectfully apprised that formula (II) is being considered as an alternative to formula (I) of Escher, not as an expansion of formula (I) of Escher, and that Escher does not teach that R^3 and R^4 must conform to the options of R^1 and R^2.

(v) Appellant argues that DE-A 3,717,668 is not automatically incorporated by reference into Kämpf, and that any assertion that the full disclosure of DE-A 3,717,668 with regard to the definition of R^1 and R^2 in formula (I) can be incorporated into Escher to broaden Kämpf [is improper].

Appellant is respectfully reminded that formula (II) is being considered as an alternative to preferred formula (I) of Escher, and that Escher does not teach that R^3 and R^4 must conform to the options of R^1 and R^2. Kämpf, as the US equivalent of DE-A 3,717,668 (priority document), is only used to provide an example of formula (II), and is therefore not being broadened.

(vi) Appellant argues that Kämpf does not disclose the preparation of poly(3,4-dioxyalkylene-thiophene)s, and furthermore does not disclose solvents that can dissolve poly(3,4-dioxyalkylene-thiophene)s, and is thus not in possession of the invention.

Appellant is respectfully reminded that Appellant presented US 4,959,430 as the US equivalent of EP-A 339 340 which first disclosed the poly(3,4-dioxyalkylene-thiophene)s (Appeal Brief dated 04/04/05, page 18). Thus the polythiophene and its preparation was already known. Kämpf is the secondary reference which teaches

poly(3,4-dioxyalkylene-thiophene)s, albeit not their preparation, as an example of formula (II) disclosed by Escher. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). See MPEP 2145[R-2] III. In the instant case, the disclosure by Escher of prior art electrically conducting polymers of formula (II) right after preferred formula (I) of Escher, is indicative that formula (II) may be used as an alternate in place of preferred formula (I) of Escher, and together with the incorporation of these prior art references into the summary (not the background) of the invention of Escher, is motivation enough for one of ordinary skill in the art to look them up. Escher does not teach against the use of the prior art electrically conducting polymers of formula (II).

(vii) Appellant argues that there is no suggestion by Escher to modify the teachings of the applied art in order to obtain the claimed invention.

Appellant is respectfully apprised that the disclosure by Escher of prior art electrically conducting polymers of formula (II) right after formula (I) is indicative that formula (II) may be used as an alternate in place of preferred formula (I) of Escher, and together with the incorporation of these prior art references into the summary (not the background) of the invention of Escher, is motivation enough for one of ordinary skill in the art to look them up. Escher does not teach against the use of the prior art electrically conducting polymers of formula (II).

(viii) Appellant speculates Escher did not claim identical substituents for R^1 and R^2 in formula (I) as for R^3 and R^4 in formula (II) because Escher had reason to believe that the polymers were outside the scope of formula (I) but within the scope of formula (II), and either did not function as orienting layers in liquid crystal or were unknown.

Appellant is respectfully reminded that Escher does not teach against the use of the prior art electrically conducting polymers of formula (II) in a liquid crystal orienting layer, and that Kämpf already discloses them. Furthermore, Appellant provided US 4,959,430 as the US equivalent of EP-A 339 340 which first disclosed the poly(3,4-dioxyalkylene-thiophene)s (Appeal Brief dated 04/04/05, page 18), and predates both Escher and Kämpf.

(ix) Appellant argue that the fact that Escher explicitly opted for narrower definitions for R^1 and R^2 than for R^3 and R^4 teaches away from one skilled in the art regarding formula (II) as an alternate to formula (I), hence the options for the R groups in formula (II) cannot have a greater scope than those for formula (I) [of Escher].

Appellant is respectfully reminded that Escher does not provide any teaching against the use of the prior art electrically conducting polymers of formula (II) in a liquid crystal orienting layer, but instead implies that the prior art electrically conducting polymers of formula (II) can also be used. Otherwise, Escher would not have mentioned these prior art electrically conducting polymers of formula (II) right after the preferred ones of formula (I), without disclosing any negative aspects of the prior art polymers.

B. Rejection of claims 7,11-12 under 35 U.S.C. 103(a) over Escher in view of Kämpf and further in view of Eguchi

(i) Appellant argues that Eguchi is only relied upon for teaching additional isolated limitations with respect to claims [7], 11-12, and therefore does not make up for the shortcomings of Escher in view of Kämpf.

Appellant's arguments directed against the combination of Escher in view of Kämpf have been addressed above. It is noted that Appellant does not argue against the valid use of Eguchi as a secondary reference.

C. Rejection of claim 17 under 35 U.S.C. 103(a) over Escher in view of Kämpf

(i) Appellant's arguments are directed against the combination of Escher in view of Kämpf, which have been addressed above.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Sow-Fun Hon

Sow-Fun Hon

June 21st, 2005

Conferees:

Carol Chaney

Harold Pyon

HAROLD PYON
SUPERVISORY PATENT EXAMINER
1772 6/23/05